इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 13910 (1993): Code of safety for sulphur dioxide [CHD 8: Occupational Safety, Health and Chemical Hazards]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA
JURIS
NON EXCUSAT

PROTECTED BY COPYRIGHT

IS 13910 : 1993
(Reaffirmed 2002)

भारतीय मानक

सल्फर डाईआक्साइड की सुरक्षा संहिता

Indian Standard

SULPHUR DIOXIDE — CODE OF SAFETY

UDC 661·24·8

© BIS 1993

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1993

Price Group 2

Chemical Hazards Sectional Committee, CHD 007

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Hazards Sectional Committee had been approved by the Chemical Division Council.

Sulphur dioxide is used mainly in the manufacture of sulphuric acid. It is also used in the manufacture of sulphite and bisulphite of sodium, sulphite pulp and a wide variety of industrial and agricultural chemicals. It finds application in fumigant, insecticide and fungicides formulations. Its another important use is for the sulphitation in sugar industry, and bleaching of various food and agricultural products. It is also used in refrigeration industry.

In the preparation of this code of safety, considerable assistance has been derived from the following publications:

a) Encyclopedia of chemical technology by Raymond E. KIRK and Donald F. OTHEMER.

b) Dangerous properties of industrial materials 1984, Sixth Edition by Irvin Sax (NI).

c) Hazard Data Bank: Sheet No. 40 — Sulphur oxide and sulpur oxide compounds — Journal of the Institution of Occupational Safety and Health, U.K.

d) Handbook of compressed gases — Second edition published by Compressed Gas Association, New York, 1981.

e) Threshold limit values for chemical substances and physical agents in the work environment and biological exposure indices — ACGIH, 1984-85.

The composition of the technical committee responsible for the formulation of this standard is given in Annex A.

Indian Standard

SULPHUR DIOXIDE — CODE OF SAFETY

1 SCOPE

1.1 The code describes properties of sulphur dioxide, the nature of hazards associated with it and essential information on storage, handling, packing, labelling, disposal, selection and training of personnel, personal protective equipment and first aid.

1.1.1 This code does not deal with specifications for design of buildings, chemical engineering plants, storage vessels and equipment for waste disposal and operation control.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
4155 : 1966	Glossary of terms relating to chemical and radiation hazards and hazardous chemicals
4167 : 1980	Glossary of terms relating to air pollution (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 4155 : 1966 and IS 4167 : 1980 shall apply.

4 GENERAL INFORMATION

4.1 General Properties

4.1.1 *Common Name* — Sulphur dioxide.

4.1.2 *Chemical Name* — Sulphurous acid anhydride.

4.1.3 *Chemical Formula* — SO_2.

4.1.4 *Molecular Weight* — 64·06.

4.1.5 *Physical Status* — Gas, liquefied compressed gas.

4.2 Physical Properties

4.2.1 *Description*

Colourless gas having a characteristic pungent odour with choking sensation.

4.2.2 *Boiling Point* — minus 10°C.

4.2.3 *Melting Point* — minus 75·5°C.

4.2.4 *Specific Gravity* — 1·434 at – 10°C.

4.2.5 *Vapour Density,* g/l — 2·264 at 0°C and atmospheric pressure.

4.2.6 *Vapour Pressure* — 2 538 mmHg at 21·1°C.

4.3 Chemical Properties

Sulphur dioxide is reported to react violently with acrolein, powdered aluminium, sodium and barium peroxides, ferrous and stannous oxides, lead and tin dioxides, acetaldehyde and chlorates via production of chlorine dioxide. It forms sulphur trioxide with air in the presence of a catalyst like vanadium pentoxide at 400°C to 600°C.

4.4 Fire and Explosion Hazard Properties

Non-flammable and not a supporter of combustion; there is no fire and explosion hazard of sulphur dioxide.

4.5 Corrosion Properties

Zinc will react with sulphur dioxide containing minute quantity of moisture and most common metals will be corroded by sulphur dioxide having sufficient amount of moisture.

5 TOXICITY INFORMATION AND HEALTH EFFECTS

5.1 Toxicity Information

5.1.1 *Threshold Limit Value (TLV)*

The upper limit of sulphur dioxide vapour concentration considered safe for continuous exposure is 5 mg/m^3 (2 ppm).

5.1.2 *Short Term Exposure Limit (STEL)*

The maximum short term exposure limit is 13 mg/m^3 (5 ppm) for 15 minutes and should not be repeated more than 4 times a day with at least 60 minutes between successive exposures.

5.1.3 *Immediately Dangerous to Life and Health (IDLH)*

1 050 mg/m^3 (400 ppm) to 1 330 mg/m^3 (500 ppm).

5.2 Health Effects

5.2.1 *Least Amount Causing Immediate Eye Irritation* — 52 mg/m^3 (20 ppm).

5.2.2 *Least Amount Causing Cough* — 52 mg/m^3 (20 ppm).

5.2.3 *Least Amount Causing Immediate Throat Irritation* — 16 mg/m^3 (6 ppm) to 31 mg/m^3 (12 ppm)

5.2.4 Sulphur dioxide causes severe irritation and asphyxiant action. Inhalation of the vapour may cause irritation of the nose and throat, severe coughing and reduction in vital capacity. Gastric trouble has also been reported. When in contact with skin or other tissues of the body, liquid sulphur dioxide cause cold burns.

6 PERSONAL PROTECTIVE EQUIPMENT

While handling sulphur dioxide, complete protective wear, comprising impervious clothing or aprons, goggles, suitable respirators, caps, rubber gloves, rubber boots and overalls covering the neck, face shield should be worn. For concentration from 2 ppm to 20 ppm (5 to 50 mg/m^3) levels, a canister type respirator with canister for acid gases should be used and for above 20 ppm (50 mg/m^3) full face piece canister type respirator should be used to avoid unpleasant eye irritation. For above 100 ppm (250 mg/m^3), as positive pressure self contained or air supplied breathing apparatus is to be used.

7 STORAGE, HANDLING, LABELLING AND TRANSPORT

7.1 Storage

Liquid sulphur dioxide is normally stored in cylinders which are provided with possible safety plugs which melts at 75°C.

7.2 Handling

Personal protective wears are to be used invariably while handling sulphur dioxide.

7.3 Labelling

All containers should bear an identifying label as per the provisions of the prevailing relevant regulations.

7.4 Transport

The container used for sulphur dioxide are selected on the basis of storage and transport. Provisions contained in the shipping regulations for marine transport and red tariff No. 19 for surface transport should be adhered to.

8 SPILLAGE/LEAKAGE AND WASTE DISPOSAL

8.1 Spills and Leakages

8.1.1 Spillages should be washed down with a large excess of water. Should a leak occur, the escaping gas is to be diluted through a caustic scrubber.

8.1.2 A sulphur dioxide leak indicates its presence by its characteristic pungent odour. The specific location of even the smallest leak may be detected by means of ammonia vapour dispersed from a respirator bottle in the area where leak is suspected. Dense white fumes will be formed near the leak where ammonia and sulphur dioxide come into contact.

8.2 Disposal and Waste Treatment

Wastes should be absorbed in water and treated with lime for neutralization before discharge.

9 FIRE FIGHTING

Being non-flammable and not a supporter of combustion, fires caused by sulphur dioxide are not known.

However, where there is a high concentration of sulphur dioxide or a possibility of its generation in the area affected by fire, the fire fighting men should use breathing apparatus.

In case of fire, cool the containers by spraying water around it because on account of heat, containers may rupture resulting toxic sulphur dioxide.

10 TRAINING AND HEALTH MONITORING

10.1 Training and Education

Safety in handling depends to a great extent upon the effectiveness of employees, education, proper safety in structions, intelligent supervision and the use of personal protective equipment.

10.2 Health Monitoring

Meticulous personal cleanliness should be observed in all operations. Physical exmination, including complete blood count (total count), urine analysis and dental examination should be carried out annually on personnel exposed to risk. Individuals suffering from diseases of skin, lungs and teeth should be precluded from sulphur dioxide exposure.

11 FIRST AID

Personnel exposed to fairly severe doses of sulphur dioxide should be removed to the fresh air immediately, should be administered oxygen and handed over to qualified medical practitioner immediately. If the eyes are affected, they should be immediately washed together with the noses using solution of sodium bicarbonate solution. If the clothing is splashed with sulphur dioxide; remove it immediately to prevent further inhalation. Generally, recovery is complete within a few days.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Chemical Hazards Sectional Committee, CHD 007

Chairman	*Representing*
Dr R. K. Garg	Defence Recruitment Board, New Delhi
Members	
Dr S. K. Awasthi Shri D. C. Bhatt (*Alternate*)	Indian Petrochemical Corporation Ltd, Vadodara
Dr A. Bhaskar Shri A. Jhavar (*Alternate*)	Hindustan Lever Ltd, Bombay
Shri A. K. Chakraborty Dr J. G. Bomane (*Alternate*)	Directorate General of Factory Advice Service & Labour Institute, Bombay
Shri A. Chatterji Shri Subir Gupta (*Alternate*)	Tata Risk Management Services, New Delhi
Shri V. H. Chudamani Shri A. G. Seshan (*Alternate*)	Hindustan Organic Chemicals Ltd, Rasayani
Shri P. K. Ghosh	Atomic Energy Regulatory Board, Bombay
Shri P. M. Karia Shri Mohan Patil (*Alternate*)	Excel Industries Ltd, Bombay
Shri K. G. Kaimal Shri Y. R. Jaishima (*Alternate*)	Directorate General of Ordinance Factory Board, Calcutta
Shri T. S. Krishnan Shri J. P. Azariah Winston (*Alternate*)	Southern Petrochemical Industries Corporation Ltd, Tuticorin
Shri A. K. Mehra Shri Surinder Kumar (*Alternate*)	Shriram Food & Fertilizers Industries. New Delhi
Dr H. Mukherjee Shri A. S. Ghosal (*Alternate*)	Department of Explosives, Nagpur
Shri L. V. Shastri	Bhabha Atomic Research Centre, Bombay
Dr D. J. Parikh Dr T. S. Patel (*Alternate*)	National Institute of Occupational Health, Ahmedabad
Dr S. S. Rathi Shri P. Das (*Alternate*)	Ministry of Defence (DGQA), New Delhi
Shri A. A. Ramakrishnan Dr Ajay Prakash (*Alternate*)	National Organic Chemical Industries Ltd, Bombay
Dr K. V. Ramalingam Shri Jayanta Adhia (*Alternate*)	Century Rayon, Kalyan
Representative	Indian Chemical Manufacturers' Association, Calcutta
Representative	National Safety Council. Bombay
Representative	Central Warehousing Corporation, New Delhi
Representative	Oil Industries Safety Directorate, Bombay
Shri J. P. Saxena Dr S. P. Sharma (*Alternate*)	Indian Drugs and Pharmaceuticals Ltd, Virbhadra
Shri K. D. Sharma Shri C. D. Bankar (*Alternate*)	Directorate General of Technical Development, New Delhi
Dr M. Sengupta Dr (Shrimati) Indrani Chandrasekaran (*Alternate*)	Ministry of Environment & Forests, New Delhi
Dr P. K. Seth Dr P. N. Viswanathan (*Alternate*)	Industrial Toxicology Research Centre, Lucknow
Shri A. C. Srivastava	Projects & Development India Ltd, Sindri
Shrimati Sunita Kumar	Development Commissioner, Small Scale Industries, New Delhi
Dr P. S. Venkataramani Dr A. K. Saxena (*Alternate*)	Ministry of Defence (R&D), New Delhi
Dr R. K. Singh, Director (Chem)	Director General, BIS (*Ex-officio Member*)

Member Secretary

Shri T. Rangasamy
Joint Director (Chem), BIS

(*Continued on page* 4)

(*Continued from page* 3)

Miscellaneous Hazards Subcommittee, CHD 007 : 05

Convener	*Representing*
Shri A. K. Mehra	Shriram Food & Fertilizers Industries, New Delhi
Members	
Additional Director	Railway Board (Ministry of Railways), RDSO, Lucknow
Joint Director (Chem) (*Alternate*)	
Dr A. Baskar	Hindustan Lever Limited, Bombay
Shri A. Jhavar (*Alternate*)	
Shri A. K. Chakraborty	Directorate General, Factory Advice Service & Labour Institute, Bombay
Shri S. S. Gautam (*Alternate*)	
Shri A. Ramamurthy	Bhabha Atomic Research Centre, Trombay, Bombay
Shri S. Narayan (*Alternate*)	
Representative	Directorate General Technical Development, New Delhi
Representative	Fertilizers and Chemical Udyogmandal, Travancore
Representative	Indian Chemical Manufacturers' Association, New Delhi
Representative	Ministry of Environment & Forests, New Delhi
Representative	Nanional Peroxides Ltd, Bombay
Representative	National Safety Council, Bombay
Representative	Navin Flourine Industries, Bombay
Dr M. K. Shah	Colour-Chem Limited, Bombay
Shri S. B. Joshi (*Alternate*)	
Shri A. P. Singh	All India Industrial Gases Manufacturers' Association, New Delhi
Dr P. N. Viswanathan	Industrial Toxicology Research Centre, Lucknow
Shri K. G. Uttamchadani	Century Rayon, Kalyan
Shri D. Ghosh Roy (*Alternate*)	

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Additions'. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc No. CHD 07 (9199)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 84 99, 37 85 61 37 86 26, 37 86 62
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	53 38 43, 53 16 40 53 23 84
Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	235 02 16, 235 04 42 235 15 19, 235 23 15
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	632 92 95, 632 78 58 632 78 91, 632 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR.
COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD.
JAIPUR. KANPUR. LUCKNOW. PATNA. THIRUVANANTHAPURAM.

Printed at New India Printing Press, Khurja, India